FORESTRY RESEARCH

WHAT'S NEW IN THE WEST

U.S. Department of Agriculture Forest Service

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What's Inside

a note to you

Forestry Research: What's New in the West, is a report on the work of the USDA Forest Service's four Forest and Range Experiment Stations in the West. These research centers, and the States included in their areas of study are: Rocky Mountain (North Dakota, South Dakota, Nebraska, Kansas, Colorado, Arizona, New Mexico, and part of Wyoming, Oklahoma, and Texas); Intermountain (Montana, Idaho, Utah, Nevada, and part of Wyoming); Pacific Northwest (Alaska, Oregon, and Washington); and Pacific Southwest (California, Hawaii, and the Pacific Basin).

on the cover

Before, during, and after views of a SEAM demonstration site on the Sheldon Mine in Arizona. See "SEAM-technology takes on surface mining problems" on facing page.

our addresses

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SEAM -- technology takes on surface mining problems

SEAM demonstration site at the Decker Mine in Montana.

Minerals and mining have been closely entwined with the history of the western United States. Since the days of the Lewis and Clark expedition, the presence of coal in the western States has been a known fact. However, in the first western rush of the 1800's, coal was largely ignored. Today, it is a coveted commodity. Demand has also been building for other mineral and energy sources. Phosphate, uranium, copper, chromium, platinum, bentonite, and many other minerals are being intensively sought and mined in the West. In addition, recent oil and gas discoveries in Utah and Wyoming have sparked a tremendous flurry of lease activity from central Utah, through Wyoming, into Montana. A large portion of the land affected by the leasing activity is administered by the Forest Service.

The mission of the Surface Environment and Mining Program (SEAM), established by the Forest Service in 1973, is to help land managers effectively cope with the complex problems of mineral management. SEAM was designed as a short-term, intensive program that could respond to the rapidly changing energy and mineral situation by supplying the most current reclamation and planning technology. SEAM, now an Intermountain Forest and Range Experiment Station Program, is headquartered in Billings Montana.

Projects currently underway in 12 western States are coordinated by Kenneth C. Scholz, Program Manager, and Associate Program Managers for research, planning, and application.

The basic target audience of SEAM is the Forest Service land manager. However, SEAM-generated information can be used by decisionmakers at all levels in other State and Federal agencies and in the mining industry.

The ultimate goal is to provide decisionmakers with the tools needed to effectively manage mineral extraction and its impacts on associated resources. A look at SEAM-sponsored research, planning, and application efforts provides some insight into how the Program is progressing toward this goal.

Research

Currently, over 130 studies are underway in such fields as spoil and overburden analysis, hydrology, revegetation techniques, impacts on wildlife, plant adaptability, spoil placement, and remote sensing.

Most SEAM studies are conducted by Forest Service research work units attached to the Intermountain, Rocky Mountain, and Pacific Southwest Forest and Range Experiment Stations. The studies are conducted either in-house or through cooperative agreements and contracts with universities, mining companies, and other Federal and State agencies. The Agricultural Research Service, Mandan, North Dakota, is also conducting a SEAM-funded study to characterize the chemical properties of overburden materials that affect water quality, plant establishment, and successful reclamation.

Since SEAM was established, other Federal agencies have increased their energy research programs. To prevent an overlap in projects, representatives of SEAM meet periodically with these agencies to inform each other of current and planned activities.

Research is underway at sites ranging from semiarid New Mexico to alpine areas in Montana. Land managers are already using data from progress reports as guidelines for: classifying areas according to their potential for rehabilitation; predicting esthetic, hydrologic, and water quality impacts; and selecting types of plants and seed mixtures as well as fertilizing, topsoiling, and mulching programs most likely to result in successful mine spoil rehabilitation.

Planning

Unless the accumulating research knowledge is understood and utilized by land managers, much of it is doomed to an idle life on library shelves. Therefore, SEAM is working to develop planning concepts and tools to help store, retrieve, and organize this information as well as array it quickly and accurately. These planning tools are being developed through contracts with universities in the West.

A contract with Utah State University has resulted in development of the Questions, Rules, and Data (QRD) concept. QRD allows a land manager to identify specific questions, then develop rules that apply to the question, and finally determine the data needed to answer the questions.

QRD is still a concept, but it is currently undergoing field verification tests on the Manti-LaSal National Forest in Utah. QRD principles also are being utilized in the land use planning process for the Ashland Division of the Custer National Forest, Montana.

Another planning tool is Goal Programming, the result of a SEAM contract with Colorado State University. It is an extension of linear programming that allows the land manager to set multiple management objectives and rank them in order of priority. Goal Programming can then provide the solution that most closely meets the objectives according to the assigned priorities. It also allows the manager to consider many different options. The State Planning Office of North Dakota is using Goal Programming to help prepare a plan for coal development in that State.

MOSAIC/Photomontage, a product of a cooperative project between SEAM and the

Aerospace Corporation, El Segundo, California, is designed to produce a low-cost, accurate portrayal of such things as surface mines, powerlines, roads, and pipelines before any development begins. MOSAIC works by overlaying computer-drawn development options on a baseline photograph of the undisturbed area. MOSAIC currently is undergoing field verification tests at Utah International's proposed surface mine near Craig, Colorado. A training package is also being prepared to help potential users apply MOSAIC to their specific needs.

Application

Currently, the SEAM application effort includes model demonstration sites, production of plant materials, and publication of accumulated knowledge. During the remainder of the Program, major application emphasis will be on developing ways to efficiently transfer knowledge to potential user groups.

SEAM has established a number of successful reclamation demonstration sites covering a broad spectrum of geographic and climatic conditions throughout the West. They include:

- Southwestern High Desert: Navajo and McKinley Mines, Four Corners area of New Mexico (coal).
- Southwestern Mountains: Sheldon Mine, Prescott National Forest, Arizona (copper).
- Northern Great Plains: Decker Mine, southeast Montana, and Black Thunder Mine, northeast Wyoming (coal).
- Northern Rockies: McLaren Mine, Beartooth Mountains, Montana (gold, silver, copper).
- Intermountain Region: Wooley Valley and Maybe Canyon mines, Caribou National Forest, Idaho (phosphate). Blackbird Mine, Salmon National Forest, Idaho (copper, cobalt).
- Southern Pacific Coast Mountains: Lucerne Valley Mine, San Bernardino National Forest, California (limestone).

In addition to solving existing problems, these demonstration areas provide basic knowledge for making intelligent decisions in the future.

SEAM demonstration on an abandoned gold mine on the Custer National Forest in Montana. The spoils were reshaped, topsoiled, and seeded with native plants collected from the surrounding area. Rubber sheets, buried under the surface, help retain moisture and control acid drainage.

SEAM is actively involved in producing plant material for mined land revegetation through the Forest Service Nursery at Coeur d'Alene, Idaho; and the Soil Conservation Service Plant Material Centers in Los Lunas, New Mexico; Bridger, Montana; Bismarck, North Dakota; and Meeker, Colorado.

At the Coeur d'Alene Nursery, native shrubs, critically needed for reclamation, are being grown using the latest containerized techniques. Some 70 shrub species are being tested for seed stratification requirements. Shrubs grown in specially-designed containers produce strong, straight, and deep root systems — important requirements for survival on harsh reclamation sites. Greenhouse production schedules can be arranged to make seedlings available for either spring or fall planting seasons. In 1976, over 50,000 native shrubs were produced in the greenhouses and shipped to various reclamation sites in the West. A handbook is being compiled that describes the most efficient way to grow individual shrub species. The containerized plant program at the nursery is based on a sound foundation built by Forest Service Research.

The work at the Soil Conservation Plant Material Centers has emphasized native grass species. In 1975, over 3,000 pounds of specially prepared seed was produced for use in reclamation activities.

Sam Sears, Nursery Technician, examines pinyon pine bound for SEAM demonstration site in New Mexico

Other activities

In addition to the projects mentioned, many others are underway. They involve studies to: analyze and design methods for transferring knowledge to specific user groups; investigate social and economic impacts of resource decisions; publish reclamation guides; refine the microdensitometer system which automatically digitizes resource photographs and line maps; develop a backpack seed collector; conduct reclamation research on spent oil shale in Utah and Colorado; and publish SEAM Alert, an up-to-date listing of completed reclamation research.

From research, application, planning concepts and tools, and other areas of the SEAM Program, will come answers to many of the problems associated with mineral development. Unhealed scars, ghost towns, and acid-choked streams show the high price paid for ignoring the environmental and social impacts of mining in the past. If history has taught any lesson, it is that wise decisions come only when there is adequate information to form them. By supplying current reclamation and planning technology to the land manager, SEAM can play a major role in helping to shape wise decisions for the future.

More information on the SEAM Program, including a list of available publications, can be obtained by writing to: SEAM, Forest Service, USDA, 145 Grand Avenue, Billings, Montana 59102; or by calling Gene Colling, SEAM Public Information Specialist, (406) 657-6468, FTS-585-6468.

—By Gene Colling, Intermountain Station

Measuring forest residues -- with pictures

Two recently published booklets will help forest resource managers make decisions about disposing of forest residues — the final step in timber harvesting or thinning operations. The booklets combine color photos of forest areas with detailed information about the wood residue shown in each photo. One covers coastal Douglas-fir and associated species; the other, ponderosa and lodgepole pine and associated species. Although the booklets were produced by the Pacific Northwest Station for use in that region, they can be used anywhere the illustrated species are found.

The photo booklets establish a common language — composed of words and pictures — which will help forest managers communicate about amounts and appearance of residues. The guides can be used to: (1) inventory residues already on the ground, and (2) predict the approximate amount of residue that will result from cutting.

The booklets are divided into sections based on timber type, size, and type of cutting. Several levels of residue are shown for each section. On the page facing each photo, tables provide data about the area pictured. The weight and volume of residue is listed in five diameter classes. The percentage of ground area covered, the depth, and the percentage of sound and rotten wood are given. Data from the cruise of the stand before cutting or thinning, facts on how and when it was cut and yarded, the amount of timber removed, the treatment, if any, of slash, and the fuel rating are also listed. For example, there are five photos of partial cuts in ponderosa pine of size class 4 (greater than 20-inch d.b.h.). The detailed descriptions of the five photos show residue levels ranging from about 3 to 30 tons per acre.

Uses

Users of the booklets will usually work from both the photo and the data. In order to inventory the amount of residue that has resulted from a partial cut in ponderosa pine, for example, the appropriate section is first located in the photo booklet. Then the several photos are compared with the area being inventoried. The photo that matches best should be selected. Data from the accompanying table can then be used to describe the residue on the ground.

Another use of the booklets is to predict the amount of residue that will result from planned cutting. By comparing cruise data from the stand to be cut with cruise data accompanying photos in the appropriate section of the booklet, the resource manager can estimate the volume and size classes of slash that will result.

A detailed inventory of residue, by size class, was made at several sample points for each area pictured in the photo booklets.

Logging residue is often removed to attain the desired level consistent with management goals.

The photo booklets also provide a tool for communicating about residues. Decisions about how much residue to remove and how to remove it are usually reached by the forester after consultation with other resource specialists. Standards for fire hazard reduction are usually met first. But, there are other important considerations, such as how much residue to leave in order to meet reforestation objectives, protect the soil from erosion, provide cover and denning sites for wildlife, or to permit access to the stand for recreation. Using the language of the photo booklets, resource specialists can easily communicate with each other about the amounts, sizes, and distribution of residue. They can reach a consensus faster and with less frustration than if each specialist were to verbally describe the residue conditions he wished to recommend.

Other uses

The use of photos to assess forest conditions is not new. For many years photos have been used to rate the fire hazard of residues. But photos taken for this purpose did not cover other aspects of residues management. Some of the National Forests in Oregon and Washington already use notebooks of photos compiled on their districts as a tool for making decisions about residues. The newly published photo series is a refinement and standardization of the notebook concept. It provides a basic reference that can easily be supplemented with photos of local areas.

The photo booklets were prepared by Wayne G. Maxwell and Franklin R. Ward of the Forest Residues Research Work Unit at the Pacific Northwest Station in Portland. Cooperators in the project were the Bureau of Land Management, the Oregon State Department of Forestry, the Washington State Department of Natural Resources, and the Pacific Northwest Region of the Forest Service. Publication of the photo booklets is part of a national Forest Service effort that will include the preparation of similar tools for other regions.

Authors Maxwell and Ward have conducted several workshops to assist Northwest forest managers in using the booklets. Maxwell calls the new photo series "a far better way of describing residues than the old system — ankle deep, knee deep, or waist deep."

At the present time, residues cause problems in most forests of the United States. They present a fire hazard and impede access to forests for management and other uses. But this may not always be the case. As the amount of residue in the forest is decreased through better cutting and yarding practices, better utilization, and the harvest of younger timber, the situation may change. In the future, researchers may want to recommend the minimum amount of residue that must be left to allow the forest to function and perpetuate itself. This photo series, and others, will provide the common language managers can use to describe the residue that should stay in the forest.

The two booklets are: "Photo Series for Quantifying Forest Residues in the Coastal Douglas-fir-Hemlock Type and Coastal Douglas-fir-Hardwood Type," General Technical Report PNW-51; and "Photo Series for Quantifying Forest Residues in the Ponderosa Pine and Associated Species Type, Lodgepole Pine Type," General Technical Report PNW-52, both by Wayne G. Maxwell and Franklin R. Ward. Copies are available from the Pacific Northwest Station.

—By Dorothy Bergstrom, Pacific Northwest Station

The Eisenhower Consortium

A recent national census confirmed that, for the first time ever, more people are living in the southern and western United States than the rest of the country.

In the West, cities are spreading and second homes and permanent residences dot a substantial portion of the surrounding rural landscape. Arizona has grown more than any other state in the Union since 1970 — 28 percent! Wyoming and Colorado jumped 17 percent. The growth rate for the entire nation was 6 percent for the same period.

People are also traveling West for skiing, camping, hunting, and other recreational experiences. In fact, so many people are now living and recreating in some areas that their activities are endangering the very attributes that brought them West in the first place — open spaces, clean air and water, scenic beauty, abundant natural resources, and recreational opportunities.

Much of the wildland environment in the Rockies and adjacent High Plains is fragile. Without care, entire ecosystems could be severely damaged or destroyed. Individuals and organizations are asking, "How can we accommodate increasing growth and its accompanying demands for natural resources while sustaining the amenity and resource values the land affords us?"

One element in solving the problem is research to obtain the facts about land use impacts. The Forest Service has a strong, long-established research program in the West that

Forest Service research, sponsored through the Eisenhower Consortium, is assessing the environmental, social, and economic impacts of mountain resort developments.

has, and is, developing knowledge basic to wise management and protection of timber, water, livestock forage, and wildlife habitat.

Consortium established

In 1972, the Eisenhower Consortium for Western Environmental Forestry Research was organized to expand research capabilities to meet the new challenges created by population growth and increasing recreational use of wildlands. Current members include the universities of Arizona, Colorado, New Mexico, and Wyoming; and Arizona State, Northern Arizona, Colorado State, New Mexico State, and Texas Tech; and the Rocky Mountain Forest and Range Experiment Station. The Consortium pools Forest Service research talent with that of the universities to form an extensive knowledge base — a base from which expertise can be drawn to find solutions to the most pressing man-environmental problems.

Over 100 Forest Service studies of various sizes have been initiated through the Consortium since its inception. These studies have focused on the impacts of recreation-oriented developments and transportation systems on (1) water quality and other resource values, (2) local economics, and (3) public safety related to wildfire.

What has been accomplished through the Consortium during its formative years? In September of 1975, the first Consortium symposium, entitled "Man, Leisure and Wildlands: A Complex Interaction," was held at Vail, Colorado. Forest Service, Consortium, and other scientists met to: pull together results of previous land management research; develop a consensus of expectations for future population growth and other impacts on the environment; and identify key areas where further knowledge is needed to guide land management decisions.

Some of these knowledge gaps are being filled by Forest Service-sponsored Consortium studies. Current research is underway to develop a manual for establishing minimum streamflow levels essential in maintaining desired aquatic and streamside environments. The proposed findings will guide planners and managers in allocating water supplies as urban and rural demands increase.

One of the major concerns for land managers has been the deterioration of scenic and other recreation areas due to over use. Consortium studies are helping to create guidelines for developing better systems for moving people through these areas while preserving scenic beauty and the other amenities our forests offer. Combined with Forest Service Research transportation planning expertise, one Consortium study led to a cooperative State and Federal effort to develop a transportation-camping management system for the Yellowstone-Teton National Parks area.

Consortium researchers are looking for ways to minimize the impacts of transportation networks on mountain environments.

Water quality research

A number of studies have been undertaken to assess the impact of recreation and development activities on wildland water quality. The results of one study on camper activity and water quality are being used by National Park Service and Forest Service planners to guide campground and picnic area development.

Other studies describe: the impacts of wastewater disposal from second homes and similar vacation developments on streams in semiarid regions; and the development of evapotranspiration systems for disposing of sewage wastes from individual homes. Conclusions

Growing population centers in the Rockies and adjacent High Plains are intensifying demands for nearby recreation opportunities and other wildland resources.

from these studies will benefit land managers, planners and developers faced with waste disposal decisions.

In the area of public safety, one project found that: quaking aspen stands act as effective fuelbreaks around mountain developments; fires are relatively hard to start in aspen; crown fires rarely occur; the rate of fire spread is slow compared to most conifer forest types; and artificial establishment of quaking aspen fuelbreaks will protect both manmade developments and natural resources of unique value.

The ultimate goal of Consortium research, sponsored by the Forest Service and other organizations, is to develop information that planners, managers, and developers need to meet immediate land use problems with wise, innovative decisions — decisions that will perpetuate clean water, beautiful surroundings, the harvest of forest and range resources, peace and quiet, and space to be alone.

Published research

Research results are published in subject matter journals as they become available. In addition, the Consortium has initiated its own bulletin series. The following are available through the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22151. When ordering, state the Bulletin number, catalog number, and title.

1976. Man, Leisure, and Wildlands: A Complex Interaction. Eisenhower Consortium Bulletin #1, Catalog #PB-248417, 286 p., Price $9.50.

Aukerman, Robert and William T. Springer. 1976. Effects of Recreation on Water Quality in Wildlands. Eisenhower Consortium Bulletin #2, Catalog #PB-251104, 25 p., Price $4.00.

Segall, Burton A. 1976. The Impact of Vacation Homes on National Forest Water Resources. Eisenhower Consortium Bulletin #3, Catalog #PB-253732, 19 p., Price $3.50.

Fechner, Gilbert H. and Jack S. Barrows. 1976. Aspen Stands as Wildfire Fuel Breaks. Eisenhower Consortium Bulletin #4, Catalog #PB-255063, 26 p. Price $4.00.

For additional information on the Eisenhower Consortium, contact Gordon Lewis, manager for the Western Environmental Forestry Research Program, Rocky Mountain Forest and Range Experiment Station, 240 West Prospect St., Fort Collins, Colorado 80521, (303) 482-7332, FTS-323-1228.

—By Rick Fletcher, Rocky Mountain Station

The wind direction and wind speed sensors at the top of each tower must be checked and calibrated regularly, a job that is handled by technicians Joseph Hancock (shown here), and Arthur Schneider.

Getting wildland weather -- fast

Results of two years of testing in the San Bernardino Mountains of southern California have shown that a network of computer-controlled weather stations can automatically collect information about wildland weather conditions and efficiently transmit the data to locations as far as 100 miles away.

Scientists in the Pacific Southwest Station's Forest Fire Meteorology Unit in Riverside, California, have been operating such a network since 1974. They report significant advantages over more conventional methods for collecting information on winds, temperature, relative humidity, and other meteorological phenomena that influence fire weather.

Morris McCutchan, leader of the meteorology team, says the key advantages of the network are in the automation, which eliminates errors in data collection, and the remote control, which permits collection of data from inaccessible or hard-to-reach sites without involving manpower.

The experimental network was built to specifications drawn up by the Fire Meteorology Unit. The system consisted of: a master station located at the Riverside Forest Fire Laboratory and controlled by a mini-computer; a base station radio; 12 instrument-laden towers, or weather stations; and 2 repeaters to amplify or "bend" signals from the more isolated stations. Each remote station contained: battery-operated electronics for receiving commands and processing data; a radio transceiver and antenna; a 12-volt battery; a panel of solar cells for recharging the battery; and sensors for measuring wind speed and direction, temperature, relative humidity, and net radiation at various heights above the ground. Towers were from 20 to 50 feet in height, depending upon their surroundings.

The automated stations were strategically placed along ridges, slopes, and in canyons in a 3-by-5 mile area, north of San Bernardino and east of Los Angeles.

The controls and electronic components of each automated weather station fit into a compact, weatherproof control box near the base of each tower.

At the research team's headquarters in the Riverside Fire Laboratory, 20 miles away from the network, the master station was programed to automatically query the remote stations at "polling intervals" selected by the scientists. The queries were sent over telephone lines to the base station radio and transmitted via very high frequency signals to the remote stations. Repeaters were required to redirect signals from two of the stations.

The Riverside scientists are satisfied with results from their first 3 years of work. They now have a good idea of how many stations they need to operate a given size network, and how the stations should be placed. They also have the data needed to verify the models, or simulations, they have developed for predicting weather conditions in mountain regions. For example, Project Leader McCutchan has used network data to test and improve his mathematical model for forecasting surface temperatures in the mountains. Dr. Bill Ryan, research meteorologist, has used network data to improve models he developed for predicting wind speed and direction in rugged terrain.

The Santa Anas

The research group is now relocating the network for use in a study of "Santa Anas" — hot, dry, foehn winds that make firefighting extremely hazardous and have indirectly caused the deaths of 94 firefighters in southern California during the past 45 years. During Santa Ana conditions, winds from the ocean, and those from the mainland, flow back and forth. The firefighter on the ground is confronted with a situation in which the winds can unexpectedly reverse direction, and the temperature and relative humidity can change rapidly.

The automated stations used in the first network will be the core of a new chain of 12 to 15 automatic weather stations in the Santa Ana study. The stations will be located along key points of what fire weather forecasters call the "Santa Ana channel" — the path frequented by these winds. Located north of the city of Los Angeles, the channel reaches northeast and southwest from the Mojave Desert to Malibu.

At each weather station, sensors for measuring temperature and relative humidity provide information about weather conditions in remote, hard-to-reach areas.

A major difference between the Santa Ana network and the previous one will be that the Santa Ana network will cover more terrain. The stations in the first network were set close together — no more than 2 miles apart, at the most. To replicate this spacing over a sizeable area would be very expensive. So, the stations in the Santa Ana network will be spread out over a larger area — about 1,000 square miles, compared to 15 square miles for the first network. The Santa Ana network will include two stations that will transmit data via satellite — a feature that will allow the scientists to place the towers in areas that are even more remote than those used in the first system.

The research team has several goals they hope to achieve during the August-November 1977 period that the network will be operating. One is to gather detailed, around-the-clock information about Santa Ana winds. When the winds are forecast, the scientists will step up the recording system by taking readings every 10 minutes instead of every hour.

Why is such detailed information needed? Dr. William Sommers, the scientist in charge of the Santa Ana network, explains, "The Santa Ana is a severe mountain wind system that is not well enough understood or predicted, making it difficult to obtain satisfactory information for wildfire management and control activities. With the new network, we hope to gather enough data to accurately model the behavior of Santa Ana winds. When completed, the model can be used to forecast their occurrence, strength, and duration. These forecasts will be of great value to fire managers who have to combat fires under Santa Ana conditions."

Research meteorologist Bill Ryan is one of the scientists using the weather information that is transmitted from remote sites to the master control station.

Station instruments

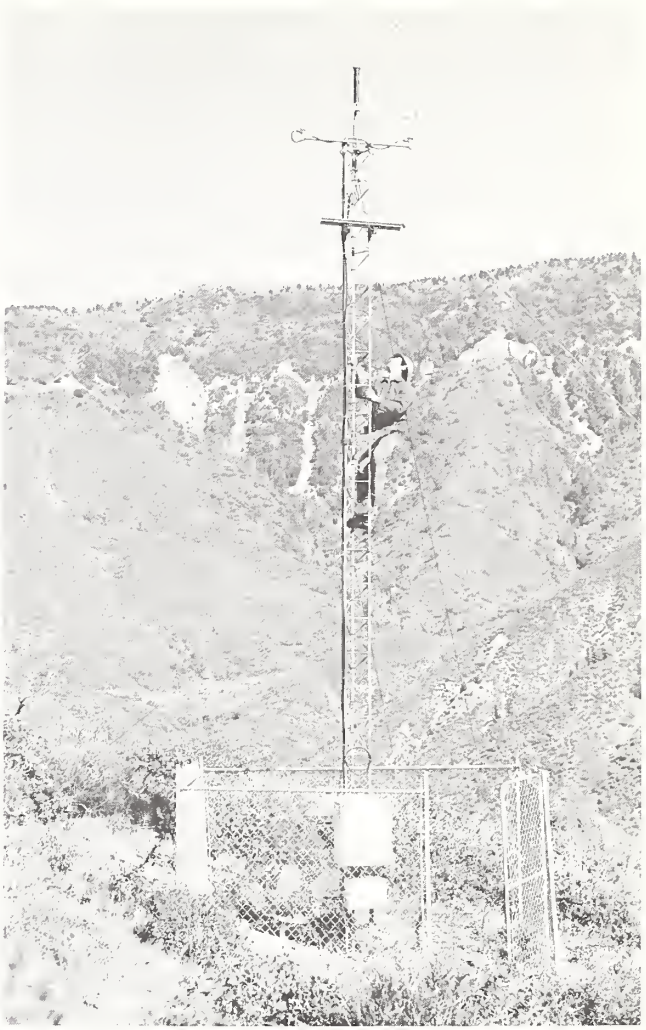
The precision instruments in the weather stations require careful calibration and maintenance, a job that will be handled by project technicians. They will supplement network data with readings from a Rawinsonde (a device used to obtain meteorological measurements at various distances above the ground) and from an acoustic sounder (an instrument that measures temperature at different heights). The Rawinsonde and acoustic sounder observations will give the researchers a three-dimensional picture of the Santa Ana flow, according to Sommers.

Another goal is to see if the data from the research network is meeting the needs of fire weather forecasters and fire managers. When data from the Santa Ana network comes in to the master station at the Forest Fire Laboratory, the controlling mini-computer will immediately dial into the "AFFIRMS" network — a computer-based system for storing and retrieving fire weather information. The Santa Ana network data will be rapidly fed into AFFIRMS, and will be immediately available to any AFFIRMS user.

For example, the data could be used by the fire management specialists at the Operations Coordination Center in Riverside, an interagency facility for coordinating firefighting and disaster work. The Center is part of the FIRESCOPE program — Firefighting Resources of Southern California Organized for Potential Emergencies. Other potential users are the meteorologists at the National Weather Service's fire weather forecast office in Los Angeles.

The mini-computer will also automatically call and feed Santa Ana data to the University of California at Riverside computer center, to be stored there for use by the Fire Laboratory researchers.

The Riverside group envisions the possibility of automated networks someday being used throughout the dry, high-fire-hazard wildlands of southern California and other remote, mountainous regions of the West Coast. They stress that automated networks may be of value not only to wildland fire control specialists, but also to people responsible for other forest management operations that require a detailed knowledge of local weather conditions. For example, entomologists could use information on wind patterns that occur during certain times of the day and different seasons. This information could help them minimize insecticide drift during aerial spraying operations.



Project technicians regularly check sensors at the top of each tower.

Readers who have questions about the network are invited to write Morris McCutchan, Fire Meteorology Research Unit, USDA Forest Service, P. O. Box 5007, Riverside, California 92507, or phone him at (714) 787-1473, (FTS-796-1473).

—By Marcia Wood, Pacific Southwest Station

New research program on California chaparral

The Pacific Southwest Station and the National Forests of California are now jointly sponsoring a new research program for improved management of chaparral ecosystems. Results of the research should help the managers of the more than 8 million acres of chaparral lands in southern California in their efforts to maintain or to enhance the productivity of these wildlands. The research findings should also be of value to the managers of other chaparral areas throughout the western United States. Headquarters for the new program will be the Experiment Station's Forest Fire Laboratory in Riverside, California.

Under the direction of Jim L. Hickman, program manager, the program staff will develop guidelines for management of the esthetic, recreational, watershed, and wildlife resources of the brushlands. Fire management measures will have a key place in these recommendations because the highly flammable chaparral lands make the fire suppression problem in southern California among the worst in the nation.

The program staff will work with other scientists at the Riverside Laboratory in developing a system for classifying chaparral lands and for determining the probable effect of various land treatments on specific areas.

The staff will also develop guidelines for prescribed burns — fires that are allowed to burn under carefully prescribed conditions to achieve a specific objective, such as reducing fire hazard or improving wildlife habitat.

New program for Hawaii, Pacific Islands, research

The Pacific Southwest Station has expanded and reorganized its research program at the Institute of Pacific Islands Forestry in Honolulu, as part of the Station's continuing effort to help solve the wildland management problems in Hawaii and neighboring islands of the Pacific Basin.

Under the new program, the Institute has increased its staff and organized four specialized research teams. Scientists in one of the new groups are concerned with protecting both native and introduced species of forest trees from destructive insect pests and diseases. This team's major assignment is to find out what is causing the widespread decline of native forests of ohia-lehua and koa. A second team is conducting research on how to protect and maintain the native plants and wildlife of Hawaiian forests, especially those species that are threatened or endangered. A top priority will be to develop management guidelines for rehabilitation of the mamane-naio forests of Mauna Kea, the home of an endangered native bird, the palila.

Researchers in a third group at the Institute will develop recommendations on how to establish, manage, and harvest forests of native or introduced tree species. Members of a fourth team will be responsible for surveying the research and resource management needs of the Pacific Basin, and for testing forest tree species for use in reforestation, type conversion, and watershed protection in Guam, the Trust Territories, and American Samoa.

Publications

Gathering facts on dispersed recreation

The Recreation Research Work Unit of the PNW Station in Seattle has developed a new tool for recreation resource managers, planners, and researchers. Called Code-A-Site, it is a system for coding basic and detailed information about dispersed recreation sites established through impromptu recreation use. These sites, many times identified only by rock fire rings, are found along forest roads and in areas accessible only by trails or other cross-country travels.

The Code-A-Site system uses 7 x 9 inch edge punch cards for recording over 28 categories of dispersed recreation site information such as location of the site, its characteristics, available resources, and ecological impacts, etc. Once the Code-A-Site information is recorded in the field, the cards can later be punched in the office, and subsequently used to retrieve and compile information using needle-sorting methods. This information can then be used by managers to direct recreationists to areas offering certain opportunities, identify heavily impacted sites, and determine needed management action.

The System is described in a recent publication titled, "Code-A-Site: A System for Inventory of Dispersed Recreational Sites in Roaded Areas, Back Country, and Wilderness," Research Paper PNW-209, by John C. Hendee, Roger N. Clark, Mack L. Hogans, Dan Wood, and Russel W. Koch. Copies are available from the Pacific Northwest Station.

Geometry tables for road construction

Land managers involved with location and design phases of road construction will find helpful information in "Tables of Geometry for Low-Standard Roads for Watershed Management Considerations, Slope Staking, and End Areas," a report published by the Intermountain Station.

Author Walter F. Megahan, Project Leader for the Idaho Batholith Ecosystems research work unit at Boise, Idaho, developed the tables. They are intended for use in situations where limited budgets preclude detailed engineering design or where engineering talents are unavailable. Using the tables, a designer can estimate the extent of slope alteration before construction and evaluate potential watershed impacts. Included in the report are road prism dimensions to assist in slope staking and estimating excavation volumes.

Copies of Megahan's report (INT-GTR-32-FR10) are available from the Intermountain Station.

Assessing the timber resource

"Data collected in timber inventories can be used to pinpoint on-the-ground problems the manager must deal with in planning forest resource management," says Alan W. Green, assistant Project Leader in Forest Resources Evaluation Research at the Intermountain Station.

In the INT publication, "Assessing the Timber Resource Situation on a Working Circle Using Inventory Data," (Research Paper INT-183-FR10), Green suggests that before assumptions are developed for use in generating a harvesting schedule, the manager needs basic information about the biological possibilities for wood production, associated costs, and the nature of the resource stock he has to work with.

The paper presents an evaluation procedure, using timber inventory data, that looks at the biological side of timber production possibilities. It demonstrates estimation of potential wood output in relation to nontimber-use demands on the forest land and to management costs. It also discusses ways to identify problems and opportunities that must be dealt with in developing harvesting schedules and long-range management plans.

Copies of Green's report are available from the Intermountain Station.

Calling the roll on plants

A recently published plant code for forest and rangelands in Oregon, Washington, and Idaho will be useful to anyone responsible for vegetation inventories in those states. It should also be useful for inventories in northern California where the same species are found. Pacific Northwest Station authors indicate the report may be of special value to those gathering information for multi-resource inventories required by the Forest and Rangeland Renewable Resources Planning Act.

"Northwest Plant Names and Symbols for Ecosystem Inventory and Analysis" is the fourth edition of the plant list and replaces "Northwest Range Plant Symbols," published in 1967. Several hundred plant names have been added. A new feature which editors and secretaries will find helpful is the notation of authorship of each scientific name in the form prescribed by the International Rules of Botanical Nomenclature.

Like the plant code it updates, the new edition allows field personnel to record information in a form that can be used directly by punch card operators. No translation to another code for the computer is necessary. The plant symbols are now standard among agencies and colleges in the three states, which facilitates pooling of data.

The plant code, General Technical Report PNW-46, was authored by George M. Garrison, J. M. Skovlin, C. E. Poulton, and A. H. Winward. Copies are available in both book and microfiche form from the Pacific Northwest Station.

Bibliography of published research

An annotated list of Rocky Mountain Station publications covering the research period from April 1, 1972 through March 31, 1976, has just been released. The list is organized by subject category: Forest Management, Range and Wildlife Habitat Management, Watershed Management, Fire and Atmospheric Sciences, Forest Insects and Diseases, Recreation, Resource Assessment and Economics, Forest Products, and Other.

Copies of RM-GTR-31-FR10 are available from the Rocky Mountain Station.

Pocket calculators go to the woods

Logging specialists and forest engineers can now carry pocket calculators to the field to check out the workability of proposed skyline logging operations. New procedures have been developed to use small, programable calculators to investigate the relationships between cable tensions, ground profile shapes, anchoring geometries, and anticipated log loads.

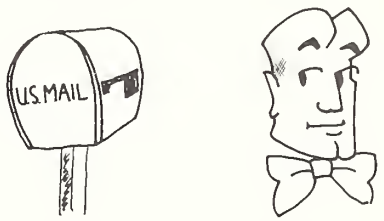
The methods were adapted by Ward Carson of the Forest Engineering Staff of the Pacific Northwest Station from methods he presented in 1971 for larger, centrally located computers. The new system lacks some of the accuracy possible with larger calculators, but the results are adequate for a wide range of practical situations.

In "Determination of Skyline Load Capability with a Programable Pocket Calculator," Research Paper PNW-205, Carson discusses two programs: one for a standing skyline; the other for a running skyline. Copies are available from the Pacific Northwest Station.

D. B. H. from stump diameter

Foresters in Arizona and New Mexico can use several methods to estimate diameter at breast height of removed trees when appraising timber removals in trespass cases, reconstructing growth plots, or conducting a forest inventory.

The easiest way is to measure stump diameters and read the corresponding d.b.h. values directly from tables developed by David W. Hann, Intermountain Station research forester. Hann's tables for seven tree species in the two States have recently been published in a Research Note titled "Relationship of Stump Diameter to Breast Height for Seven Tree Species in Arizona and New Mexico." For your copy, write the Intermountain Station and ask for Research Note INT-212-FR10.



Keep a close watch for our next issue. Feature articles will include information on: the product potential of standing dead timber; FIREBASE — an information retrieval system; resources evaluation techniques; and forest soil fertility.

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